

MitoBench: An interactive visual workbench for population genetics on mitochondrial DNA



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MAX-PLANCK-GESELLSCHAFT

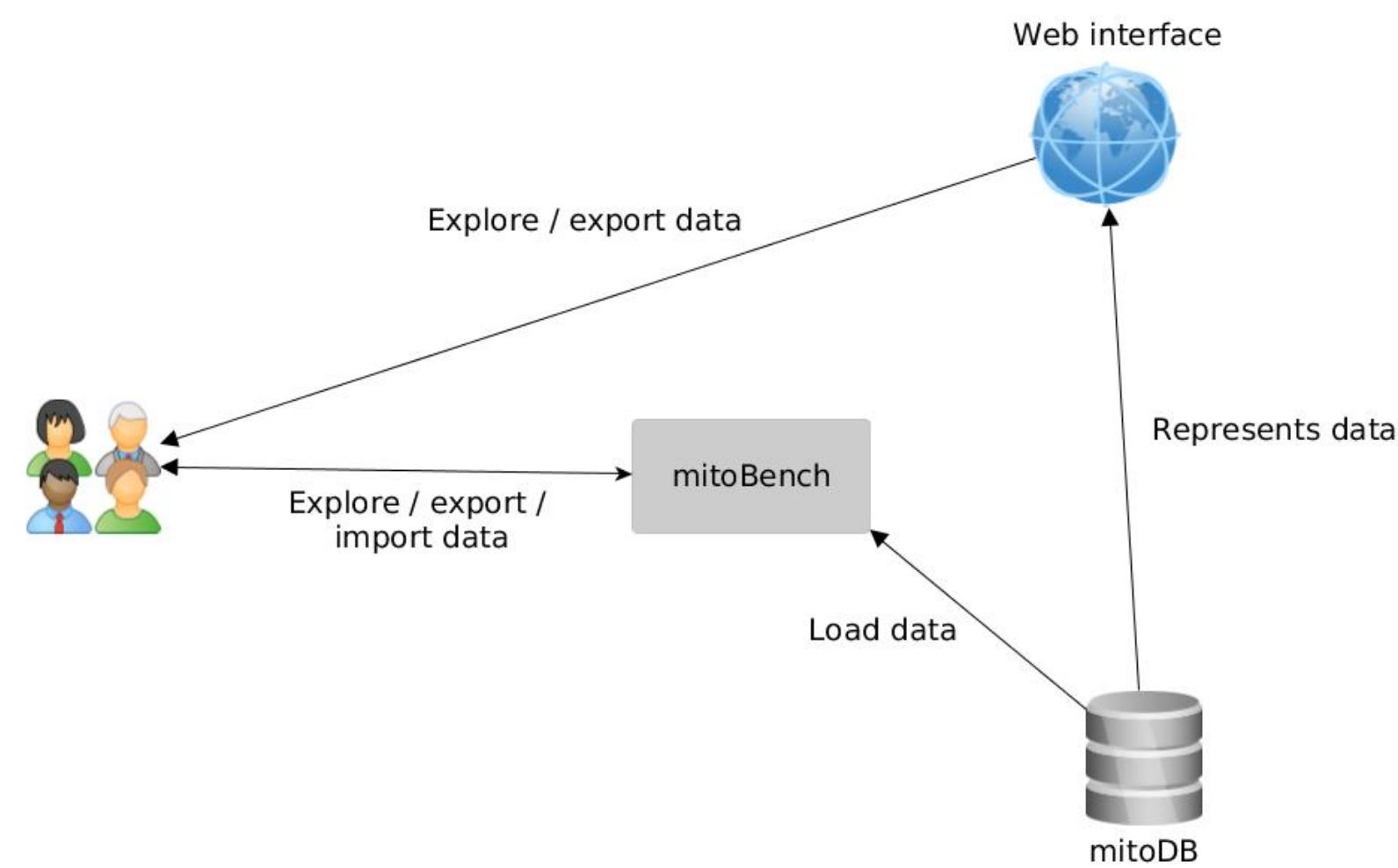
Introduction

Despite the availability of modern next generation sequencing technologies and therefore nuclear human genomes, the sequencing and analysis of mitochondrial DNA (mtDNA) is still common. Especially in the research field of ancient DNA and the context of population genetics, mtDNA is often the only proxy available to study extinct populations and their relationship with modern populations. As a consequence, many population genetic studies rely on the analysis of mtDNA.

A plethora of methods for the analysis of mtDNA exist, that address questions in population genetics, phylogeny and others. However, these tools typically rely on different file formats and often require manual interaction with the data for downstream analysis. Ultimately, these steps can be cumbersome, especially for non-bioinformaticians, resulting in an increased risk of errors during the analysis.

To tackle these issues, we present MitoBench, a workbench to interactively analyze and visualize mitochondrial genomes with a focus on population genetics. The graphical user interface is kept simple, to accommodate even users without further prior knowledge on computational methods. Furthermore, it shows additional information such as metadata and statistics. Currently, MitoBench offers automatic file conversion tools to connect the workbench with existing analysis methods such as BEAST, Arlequin and others.

Workflow

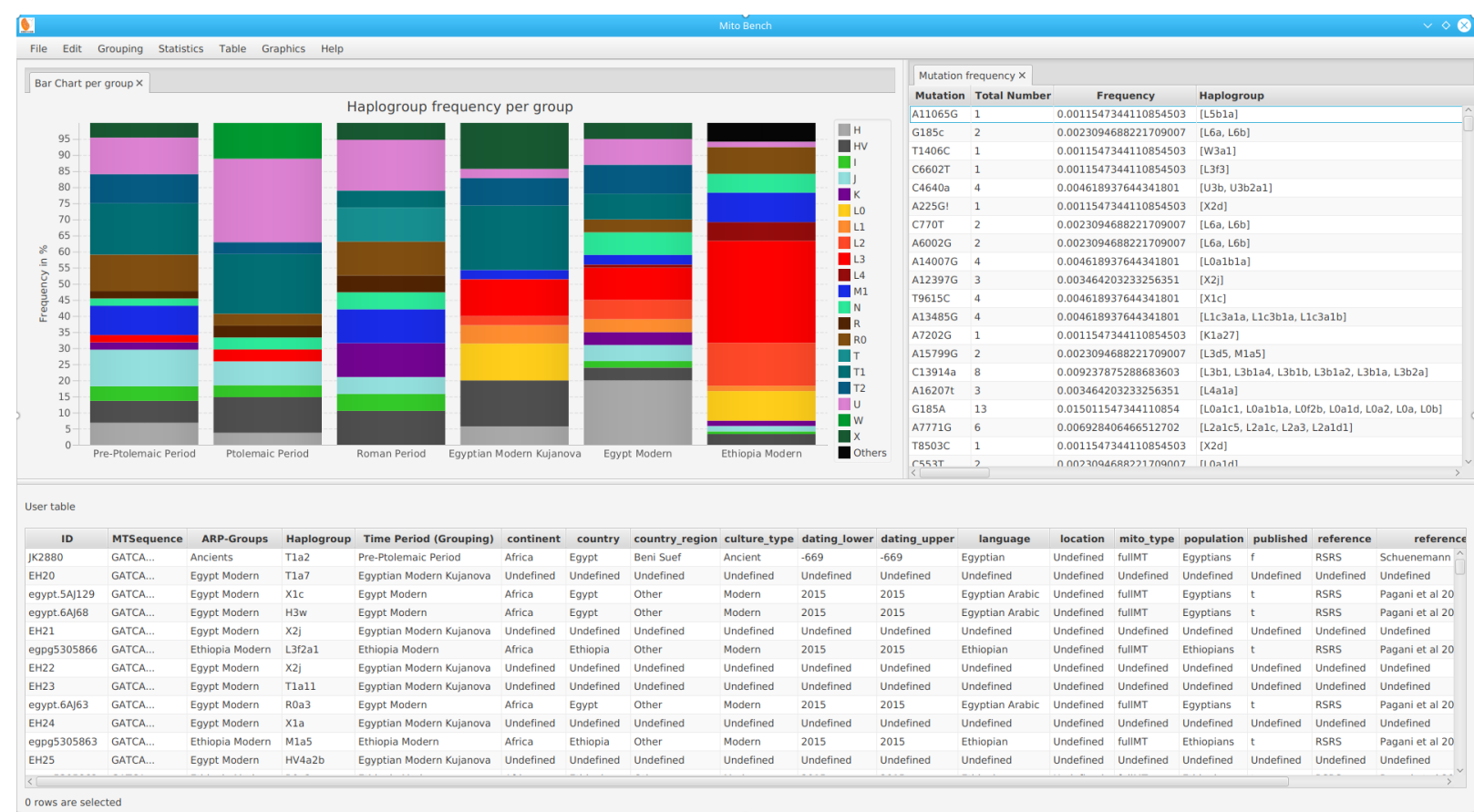


MitoDB

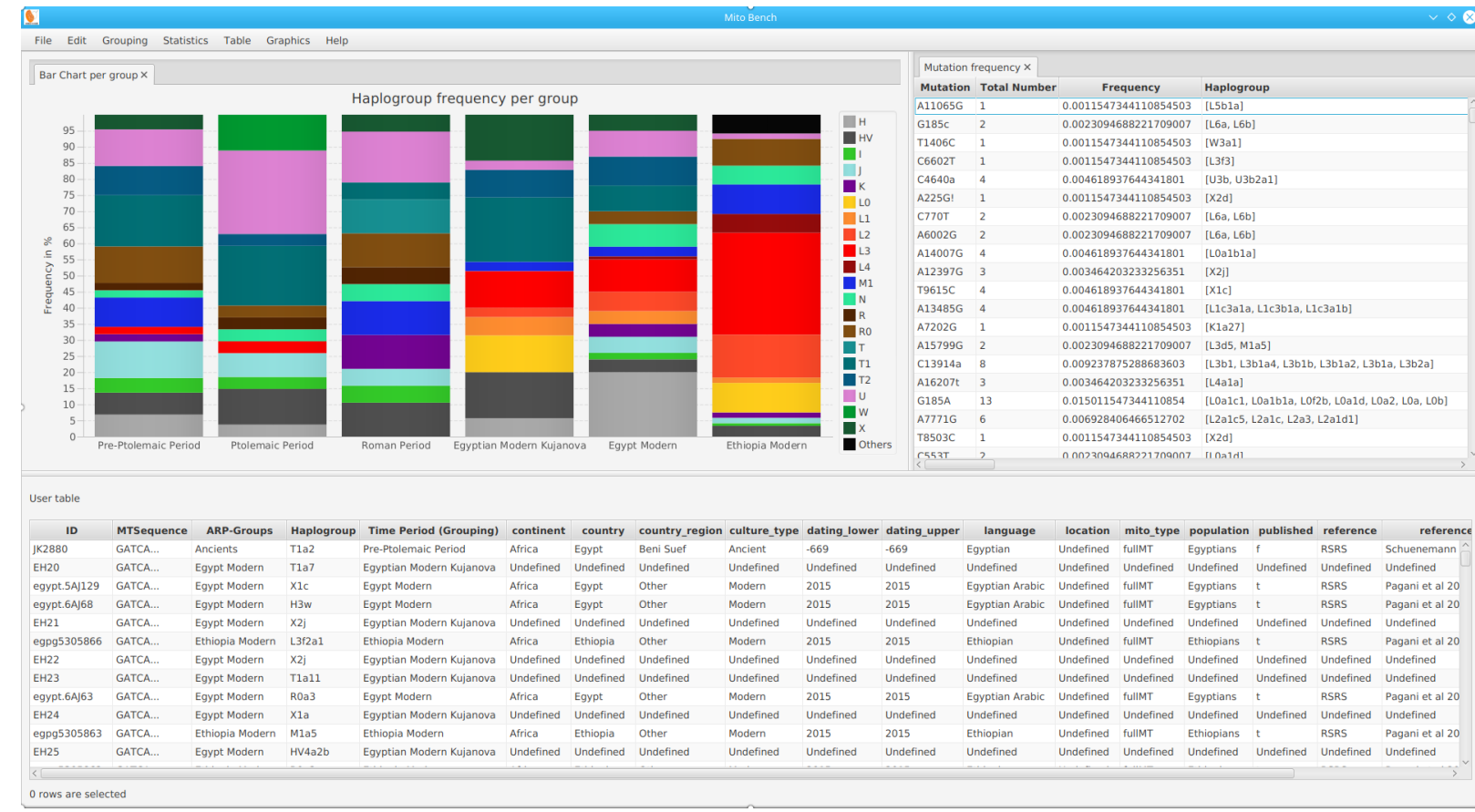
- Web-Frontend with Vaadin Java Framework
- Backend with PostgreSQL, providing sequence information and meta-data (SQL)
- Curated data upload with metadata
- Retrieval possible through WebUI and mitoBench

MitoBench

Data representation



Data visualization



Data filtering / Statistics

- Haplogroup filtering
- Filtering based on Mutation
- Haplogroup frequencies
- Mutation frequencies

Data grouping

- user-defined groups
- grouping by column

Conclusions

MitoBench

- Easy file handling and file conversion
- Combination, manipulation and visualization of MT data
- Multiple filtering options
- Statistics

MitoDB

- Collect mitochondrial data

Contact

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